



**STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

DIVISION OF UNDERGROUND STORAGE TANKS

COMPLIANCE GUIDANCE DOCUMENT - 105

**EFFECTIVE DATE - July 29, 1996
(REVISION DATE - July 19, 1999)**

RE: REQUIREMENTS FOR GROUNDWATER MONITORING

The purpose of this guidance document is to assist the regulated community in understanding the regulatory requirements for *Rule 1200-1-15-.04(3)(f)* Ground water monitoring. This rule states the following:

Groundwater monitoring. Testing or monitoring for liquids on the groundwater must meet the following requirements:

- 1. Groundwater monitoring shall not be allowed in areas where the tank excavation zone has encountered bedrock.*
- 2. The petroleum stored is immiscible in water and has a specific gravity of less than one;*
- 3. Groundwater is never more than 20 feet from the ground surface and the hydraulic conductivity of the soil(s) between the UST system and the monitoring wells or devices is not less than 0.01 cm/sec (e.g., the soil should consist of gravel, coarse to medium sands, coarse silts or other permeable materials);*
- 4. The slotted portion of the monitoring well casing must be designed to prevent migration of natural soils or filter pack into the well and to allow entry of petroleum on the water table into the well under both high and low groundwater conditions;*
- 5. Monitoring wells shall be sealed from the ground surface to the top of the filter pack;*
- 6. Monitoring wells or devices intercept the excavation zone or are as close to it as is technically feasible;*
- 7. The continuous monitoring devices or manual methods used can detect the presence of at least one-eighth of an inch of free product on top of the groundwater in the monitoring wells;*
- 8. Within and immediately below the UST system excavation zone, the site is assessed to ensure compliance with the requirements in parts (f) 1. - 5. of Rule 1200-1-15-.04(3) and to*

establish the number and positioning of monitoring wells or devices that will detect releases from any portion of the tank that routinely contains petroleum; and

9. *Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.*

INTRODUCTION

Groundwater monitoring is a monthly method of external release detection and can be utilized as a sole method of release detection for tanks as well as the piping system if conditions are favorable. Petroleum leaking from underground storage tank systems (UST) is commonly released in the liquid phase. Released liquid product tends to migrate toward the groundwater surface or water table. This method of release detection utilizes devices which allow monitoring of floating liquid product on the groundwater surface. Groundwater monitoring wells are typically constructed of 2 inch to 4 inch inner diameter (I.D.) polyvinyl chloride (PVC). Other materials which may be used are stainless steel, cast iron, galvanized steel, polyethylene, polypropylene fluorocarbon resins, or Teflon.

REQUIREMENTS FOR GROUNDWATER MONITORING

In the UST excavation zone, the site must be assessed by a qualified individual, for example a Professional Geologist or Professional Engineer. If the groundwater wells were installed before August 1, 1996, the owner may determine if the wells are in the UST system excavation zone and the monitoring requirements are met. The site assessment information for wells installed on or after August 1, 1996 shall contain a notarized statement with a perjury clause that the site is acceptable for groundwater monitoring.

1. Groundwater monitoring is allowed only if ground water is within 20 feet of the ground surface at all times of the year.
2. Groundwater monitoring shall not be allowed where the tank system excavation zone(s) has/have encountered bedrock.
3. The monitored liquid product must float on top of the water and not easily mix with water.
4. The medium between the UST system and the monitoring wells must have a hydraulic conductivity equal to or greater than 0.01 cm/sec (gravel, coarse to medium sand, coarse silt, or other permeable material).
5. Minimum requirements for groundwater monitoring well design are:
 - a. The slotted or perforated section of the monitoring wells must extend below the lowest level of the associated UST or product piping excavation. Monitoring well screens must have 0.01 inch factory milled slots. The screen must intersect the ground water table at all times.
 - b. The slotted or perforated section of monitoring wells must prevent soil or backfill blockage and allow entry of groundwater and liquid product.

- c. Monitoring wells should be installed inside the tank excavation area or as close as technically possible.
 - d. Monitoring wells must be sealed from the top of the backfill or filter pack to the ground surface.
 - e. Monitoring wells must be clearly marked and locked with a waterproof cap.
 - f. Monitoring wells installed outside the excavation area must follow the Division's current Environmental Assessment Guidelines for monitoring well construction and development.
- 6. Groundwater must be present in the wells at all times. If groundwater drops below levels sufficient for monitoring, then groundwater monitoring must be replaced with some other approved method of release detection in accordance with *Rule 1200-1-15.04*.
 - 7. Monitoring wells must be installed and spaced to assure detection of free product within 30 days. The minimum requirement for each tank excavation will be two (2) monitoring wells.
 - 8. Groundwater monitoring equipment must be capable of detecting a minimum of 1/8 - inch of liquid product on top of groundwater.
 - 9. The assessment must include the following:
 - a. Documentation that will demonstrate compliance with the above listed requirements.
 - b. A scaled drawing of the site that will show UST system components and monitoring well locations.
 - c. Direction, gradient, and velocity of groundwater flow in order to determine the location and required number of monitoring wells.
 - 10. The monitoring device must be installed, calibrated, and maintained in accordance with the manufacturers instructions, including routine maintenance and service checks for operability or running condition.

Note: Sites with previous contamination may not be suitable for groundwater monitoring. If a site has a confirmed release, the owner/operator must be able to demonstrate that all free product has been removed before groundwater monitoring can be used as a method of release detection.

REPORTING AND RECORDKEEPING

If monitoring results indicate the UST system may have had a release, then the owner and/or operator shall notify the Division within 72 hours and begin release investigation and confirmation steps in accordance with *Rule 1200-1-15-.05(3)*. This applies unless the monitoring device is found to be defective, and is immediately repaired, recalibrated, or replaced, and additional monitoring does not confirm the initial result. If the monitoring device is determined to be defective and a suspected release was not reported to the Division, the owner/operator shall document that

the device was defective and the actions taken for correction. This documentation shall also include additional monitoring results.

Any of the following may constitute a suspected release:

- a. Any automatic or continuous monitoring device which signals an alarm.
- b. Observation of any liquid product during manual monitoring.

Monitoring result records shall be kept for the last twelve months and must include, but not necessarily be limited to the following:

- a. Date of reading.
- b. Well number or some other means of identifying well.
- c. Depth to groundwater from ground surface.
- d. Monitoring results.
- e. Name and Initials of person taking the reading.
- f. If a release was detected, describe what actions were taken.

Note: The attached form may be photocopied and used for documentation of ground water monitoring results.

Records of the release detection being performed must be maintained and be made available to the Division during an inspection. Results of any sampling, testing, or monitoring must be maintained for at least 1 year.

Records pertaining to the installation of the groundwater monitoring system should be maintained. Records of all calibration, maintenance, and repair of release detection equipment permanently located on-site must be maintained for at least one year after the servicing work is completed. Any schedules of required calibration and maintenance provided by the release detection equipment manufacturer must be retained for five (5) years from the date of installation. Note: Records of UST system repairs must be maintained for the life of the UST system.

As-built scaled drawings of the monitoring wells showing well construction through a cross-sectional diagram must be kept for the life of the system.

Records must be kept at the UST site and immediately available for inspection by the Division; or at a readily available alternative site and be provided for inspection to the Division upon request.

Note: Groundwater monitoring may be used on piping provided that it is designed to detect a release from any portion of the underground piping that routinely contains petroleum. For additional information concerning release detection requirements on UST piping, see Compliance Guidance Document (CGD) - 110 for pressurized piping or CGD - 111 for suction piping.

SITE SKETCH

GROUND WATER MONITORING WELL RECORD

Depth from Ground Surface _____

Depth To Tank Bottom (in feet) _____

Facility Name _____

Facility ID # _____

Depth to Top of Ground Water (in feet)						Free Product in Well (Yes/No)*	Observer's Name	Observer's Initials	
Month/Year	Well # 1	Well # 2	Well # 3	Well # 4	Well # 5	Well # 6			

*If present note the thickness of free product